

*EFFECTS OF IDIOSYNCRATIC STIMULUS  
VARIABLES ON FUNCTIONAL ANALYSIS OUTCOMES*

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As the methods for the functional analysis of problem behavior have continued to develop, there has been a greater focus on the specificity of controlling variables, both antecedents and consequences. Accelerating research interest in the role of antecedents reveals that a large array of stimulus variables can influence the rate of problem behavior. Indeed, the variety of these stimuli is so great that it is sometimes possible to overlook specific stimulus variables during initial assessment. The present study shows that a failure to identify these very specific (idiosyncratic) stimulus variables is serious because their presence can systematically alter the outcomes of functional analyses that are designed to assess the motivation of problem behavior. Guidelines are therefore discussed concerning when to suspect that idiosyncratic stimuli might be acting to influence assessment data, thereby promoting a search for additional stimulus variables whose identification can aid in improving the design of functional analysis conditions.

DESCRIPTORS: functional analysis, stimulus control, problem behavior, developmental disabilities

Severe problem behavior has been conceptualized as being influenced by both antecedent and consequent variables (Carr, 1977; Repp, Felce, & Barton, 1988). On the consequence side, such behavior is maintained by three general classes of reinforcers (Iwata, Vollmer, & Zarcone, 1990). First, problem behavior may be a function of positive reinforcement, for example, contingent social attention (Carr & McDowell, 1980; Lovaas, Freitag, Gold, & Kassorla, 1965). Second, it may be maintained through a process of negative reinforcement, such as escape from aversive demands (Carr, Newsom, & Binkoff, 1976, 1980; Steege, Wacker, Berg, Cigrand, & Cooper, 1989). Finally, problem behavior may be maintained by automatic reinforcement (nonenvironmental

factors). An example is self-injury motivated by sensory reinforcers (Favell, McGimsey, & Schell, 1982).

The research literature suggests that very specific features of the generic attention, escape, and automatic reinforcement categories determine the extent to which these variables maintain severe problem behavior (Carr, 1994). As an illustration, consider problem behavior maintained in an escape paradigm. The specific nature of the negative reinforcer may vary widely across individuals and situations. Thus, negative reinforcement may sometimes consist of termination of demands, gestural or physical prompts, negative feedback, or termination of long as opposed to short tasks (Carr & Carlson, 1993; Dunlap, Kern-Dunlap, Clarke, & Robbins, 1991; Kemp & Carr, 1995). This reinforcer specificity raises an important issue for functional analysis, in that the assessor needs to be aware that a failure to demonstrate orderly effects with respect to a given generic category (e.g., escape) does not necessarily mean that that

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category per se has no role in the maintenance of problem behavior. For example, if an individual's aggressive behavior is in fact maintained by negative reinforcement based on termination of physical prompts, then manipulating demand termination per se will have little effect on aggressive behavior, because it is the termination of prompts rather than demands that is critical. Because it is not always easy to determine in advance what parameter of a consequence is most relevant to a functional analysis, the issue of reinforcer specificity is of enduring interest to behavior analysts.

The previous discussion on the role of consequences is also relevant to the role of antecedents. As an illustration, when termination of a prompt constitutes a negative reinforcer for aggression, the prompt itself may become a discriminative stimulus (antecedent) for the aggressive behavior. This is so because behavior (aggression) emitted in the presence of the prompt reliably produces termination of the aversive stimulus (i.e., the prompt). Given that there are many kinds of prompts (i.e., gestural, physical, verbal, imitative), there is always a question of which type is most worth examining in a functional analysis. Again, selecting the wrong type (e.g., a verbal prompt when, in fact, it is a physical prompt that evokes escape behavior) would yield negative experimental findings as well as the mistaken conclusion that escape variables may not be relevant to the control of the aggressive behavior. Because multiple types of prompts are commonly present in, for example, community-based learning situations, it is sometimes difficult to determine in advance which type is critical (Carr & Carlson, 1993; Kemp & Carr, 1995) so that the most relevant assessment can be conducted. A similar point can be made with respect to task demands, a common antecedent for escape-motivated problem behavior. For example, Iwata, Pace, Kalsher, Cowdery, and Cataldo

(1990) demonstrated that very specific characteristics of demands determine functional analytic outcomes. Thus, tasks that were typically used for 2 individuals (i.e., sorting, pointing) were less effective in evoking self-injurious behavior than were tasks that required effortful motor responses (e.g., dressing, tying shoes) or tasks related to certain aspects of a medical examination. Given the large number of dimensions across which numerous antecedents can vary, determination of the parameters most relevant to subsequent functional analysis is a daunting task that behavior analysts have, nonetheless, recently begun to address systematically.

There has been an accelerating interest in exploring the variety and complexity of antecedents that can influence problem behavior. Demonstrations have included the role of task novelty and rate of task presentation (Smith, Iwata, Goh, & Shore, 1995), meal schedule (Wacker *et al.*, 1996), allergies and sleep deprivation (Kennedy & Meyer, 1996), presence versus absence of specific staff members (Halle & Spradlin, 1993; Touchette, MacDonald, & Langer, 1985), number of people present (Boe, 1977; McAfee, 1987), and presence versus absence of protective clothing (Silverman, Watanabe, Marshall, & Baer, 1984). Finally, Mace and Lalli (1991) began to systematize the process of analyzing antecedents by showing how descriptive data might be used to identify potentially influential variables that could be included in subsequent experimental analyses.

Given the large number of specific antecedents that have been demonstrated to influence problem behavior, it is plausible that one might occasionally overlook relevant antecedent stimuli during the course of conducting a functional analysis, with the result that the analysis produces misleading results. In the present study, we explored a case in point. Specifically, for 3 individuals with developmental disabilities, our initial inter-

views with staff or direct observation suggested that severe problem behavior might be a function of attention or escape variables. However, subsequent additional observations suggested that the presence or absence of specific idiosyncratic stimulus variables within the functional analytic session itself greatly influenced the type of results obtained. The main purpose of the present study was to demonstrate the influential role that unanticipated idiosyncratic stimulus variables can play in affecting the outcome of a functional analysis, thereby drawing attention to the need for evolving a set of guidelines for identifying when these pervasive and potentially influential variables might be present.

## METHOD

### *Participants and Setting*

Participants were identified first through interviews with classroom staff who worked in a program for people with developmental disabilities. We asked staff to describe any students with a history of problem behavior such as aggression, self-injury, or property destruction. These interviews provided preliminary indications of individuals who responded to different situations with problem behavior.

Based upon the results of these interviews, 3 participants were selected for inclusion in the study. The medical staff had diagnosed all 3 as having autism. Sam was 20 years old with a mental age of 3 years 10 months (Stanford-Binet), and Bart was 13 years old with a mental age of 4 years (Leiter International Performance Scale). Both Sam and Bart communicated using single-word labels. Don was 15 years old, and his composite score on the Stanford-Binet was 52. He was echolalic, but could use three- to seven-word sentences to express his basic needs.

Sessions were conducted in a tutorial

room (3 m by 3 m) equipped with a two-way mirror to allow videotaping.

### *Procedure*

*Preliminary naturalistic observation.* Following the identification of participants, trained undergraduate observers conducted naturalistic observations in the school to generate information on the problem behavior of each participant. Their training, spread out over a period of 1 month, included reading a standard text on functional assessment (O'Neill, Horner, Albin, Storey, & Sprague, 1990) as well as practice in filling out assessment sheets drawn from the text. The naturalistic observation itself was conducted and data were collected using an antecedent-behavior-consequence narrative protocol (Carr et al., 1994). When problem behavior such as self-injury or aggression occurred, the observers noted the behavior displayed, the stimulus variables that occurred prior to the behavior (antecedents), and the stimulus variables that followed the behavior (consequences). The observers were also instructed to record idiosyncratic social and physical stimulus variables that were associated with both increased and decreased rates of problem behavior. Specifically, social stimulus variables could pertain, for example, to the presence or absence of particular personnel. Physical variables might include idiosyncratic objects, materials, or activities present during observation periods.

Observational data were collected over a period of 1 to 3 months. When the observational data were collected, they were examined by the investigators to identify antecedent and consequent variables associated with changes in rates of problem behavior. Idiosyncratic stimulus variables were also identified and were subsequently incorporated into the functional analysis procedures to determine their effects on problem behavior.

*General functional analysis procedures.* In the functional analysis sessions, social dis-

approval and academic demand conditions were employed to assess socially motivated forms of problem behavior (i.e., attention and escape, respectively) using the protocol developed by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994). Sessions lasted for 15 min and were conducted by either the second or third author or by a trained research assistant.

In the social disapproval (social attention) sessions, participants were given attention in the form of concern or disapproval contingent upon each episode of problem behavior. Specifically, the experimenter and participant were present in the room together, with several recreational items (e.g., sports equipment, balls, games, etc.) placed upon a table in front of the participant. The experimenter held a book and started sessions by instructing the participant as follows: "I need to do some work now, so you play with those games while I read." The experimenter then stopped all interaction with the participant to do "work." If the participant displayed self-injury, aggression, property destruction, or other problem behavior, the experimenter discontinued reading and attended to the participant by expressing concern or disapproval of the problem behavior (e.g., "Please stop hitting me. That is not a very nice thing to do."). This condition served as an assessment of the degree to which problem behavior was motivated by attention.

In the demand sessions, participants were presented with various educational activities and were required to respond to academic demands. Problem behavior resulted in the brief termination of academic demands. For example, if the experimenter presented the participant with a demand to identify different dinnerware items and the participant responded to the demand by hitting the experimenter, the experimenter then cleared the table of the dinnerware items associated with the demand and backed away from the participant for a 30-s interval. Following the

30-s interval, the experimenter approached the participant and resumed the demand. This procedure was repeated throughout the session. The demand condition assessed the degree to which problem behavior was motivated by escape from demands.

In the final component of the procedure, the specific additional (idiosyncratic) stimulus variables that had been identified through the naturalistic classroom observations were manipulated experimentally to determine their effects on functional analysis outcomes. The individualized analytic procedures used for each participant are described below.

*Individualized functional analysis procedures: Sam.* For Sam, the procedures just described took place in three phases (the results of which will be reported later). The preliminary interview with Sam's teacher indicated that both social attention and escape from demands were potentially relevant variables to consider in the functional analysis. Therefore, in the initial series of functional analyses, Sam was exposed to both the social disapproval and demand conditions (e.g., "Fold your shirts," "Sort the dinnerware," plus several other demands relevant to facilitating group-home living) in the general format described above. The results of this initial analysis did not reflect the high rates of problem behavior that Sam's teacher had reported. Therefore, the naturalistic observations described previously were carried out and used as the basis for redesigning the functional analysis.

The rationale for the second series of functional analyses was as follows. The naturalistic observations indicated that Sam often held on to small objects, particularly wristbands. However, on rare occasions when Sam was not allowed access to his wristbands, he misbehaved. We also noted anecdotally that during the initial phase, Sam had brought his wristbands into the assessment room and held on to them during

both the attention and demand conditions. Therefore, to control for idiosyncratic stimulus effects associated with the possession of wristbands, we carried out a second series of functional analyses in which we required Sam to leave the wristbands behind prior to entering the assessment room.

Although we had eliminated wristbands from the second analysis, other small objects (e.g., balls) were present in the room. Again, we noted anecdotally that during the attention condition, Sam obtained small objects, such as balls, and held one in each hand. In contrast, during the demand condition, because we had to prompt Sam frequently and maintain close physical proximity to him, he had no opportunity to walk over to the small objects in the room and obtain them. This observation caused us to carry out a third series of functional analyses to control for the presence of small objects per se. We hypothesized that problem behavior was not motivated by the presence of demands, but rather by the absence of small objects in Sam's hands. Therefore, in the third set of analyses, we eliminated demands altogether and conducted only social attention conditions. Further, and critically, we manipulated the size of the objects present. In one condition, only small balls (i.e., those that were small enough for Sam to hold in his hands) were present, whereas in the contrasting condition, only large balls (i.e., too large for Sam to hold in his hands) were present.

*Individualized functional analysis procedures: Bart.* For Bart, both the interview and naturalistic observation phases revealed high rates of problem behavior in academic demand situations under certain stimulus conditions. Because task demand situations in the classroom were associated with problem behavior, the functional analysis used only academic demand sessions as the means of assessing the influence of stimulus variables on problem behavior. The observational data indicated that idiosyncratic stimulus char-

acteristics of Bart's physical environment were associated with changes in rates of problem behavior. Specifically, when puzzles were present in any room that Bart was in, he became disruptive and began throwing the puzzles, with problem behavior sometimes escalating to the point at which he displayed self-injury in the form of hand biting or hitting himself. Therefore, the demand condition (designed to assess the influence of this stimulus parameter) involved the placement of several puzzles in the room (on a table located 1 m from the work area) in which the functional analysis was conducted. To control for the presence of puzzles per se, books similar to the puzzles in shape and size were used as control objects in the comparison demand sessions. During all functional analysis sessions, Bart was presented with a variety of table tasks (e.g., labeling pictures, math flash cards) that required responses such as pointing or counting.

*Individualized functional analysis procedures: Don.* During the interview, Don's teacher suggested that his self-injury was motivated by attention, because Don seemed to bite himself more whenever the teacher was busy working with another student. However, during the naturalistic observation, we noted increased rates of self-injury when certain magazines (e.g., *People* and *TV Guide*) were present but not accessible. Indeed, when Don was allowed access to these magazines, he would persevere on them (i.e., leaf through them repeatedly) but never displayed self-injury. We attempted to incorporate all of this information into the functional analysis as follows. First, in order to simulate the putative attention-seeking aspects, we conducted only social attention sessions. Second, to assess the role of idiosyncratic stimuli (i.e., the magazines), we had the experimenter read the magazines during the time when she said she was "too busy" to interact with Don. Don, in turn, was provided with a variety of recreational



materials and was encouraged to use them while the experimenter did "work." In this manner, we were able to assess the impact of stimulus inaccessibility (of the magazines) on problem behavior. As a control for magazines per se, we ran a comparison condition in which the experimenter read books unrelated to the idiosyncratic magazine material (e.g., *The Grapes of Wrath* by Steinbeck).

#### *Definition and Measurement of Problem Behavior*

Target behaviors identified for each participant included aggression (hitting, biting, pulling hair, pinching, scratching, or kicking other people), self-injury (biting, hitting, or kicking self, head banging, or hitting stationary objects such as tables or walls with arms), and disruptive behaviors, such as property destruction or throwing objects.

For Sam, self-injury was the primary form of problem behavior and was defined as slapping or punching himself. Self-injury was also scored for Sam when he forcibly hit his knees together, kicked himself or the ground with one of his feet, or hit himself in the side with his elbows. Aggression for Sam was defined as striking the experimenter with an open or closed hand, or kicking the experimenter.

Bart's disruptive behavior was defined as throwing academic task materials and puzzles or knocking task materials and puzzles off the work table. Bart also displayed self-injury, which was defined as placing his hand in his mouth while biting or striking his torso with an open or closed hand.

The primary topography of problem behavior for Don was self-injury, specifically wrist biting. Self-injury for Don was defined as placing his arm, wrist, or hand in his mouth while biting.

Data for all participants were recorded as frequency counts and were collected for the duration of the project.

#### *Experimental Design*

The study was conducted using a reversal design to allow a comparison between the rates of problem behavior in sessions that did not include the idiosyncratic stimulus variables with the rates of problem behaviors in those sessions in which the idiosyncratic stimulus variables were included.

#### *Interobserver Agreement*

Videotapes were coded for the frequency of participant behavior problems in real time using the Portable Computer System software (Repp, Karsh, Van Acker, Felce, & Harman, 1989). An agreement was scored if both observers coded an event within 3 s of each other. Reliability checks were taken by a second independent observer in 51% of the total sessions for Sam, 48% for Bart, and 50% for Don. Agreement was calculated on the frequency of problem behavior by computing the number of agreements divided by the number of agreements plus disagreements and multiplying by 100%. The mean interobserver reliability was 95.7% for Sam, 96.9% for Bart, and 100% for Don. The mean interobserver reliability on behavior problems for all sessions across all participants was 96.6% (range, 80% to 100%).

## RESULTS

### *Sam*

Figure 1 shows the results of the initial functional analysis for Sam. Sam was allowed access to small objects (i.e., wristbands or other small objects that he frequently carried) during all sessions that are depicted in Figure 1. The results of the initial functional analysis revealed slightly higher frequencies of problem behavior in academic demand conditions (mean frequency of 6.1 problem behaviors per session) than in social attention conditions (mean frequency of 1.4 problem behaviors per session), but the overall frequencies of problem

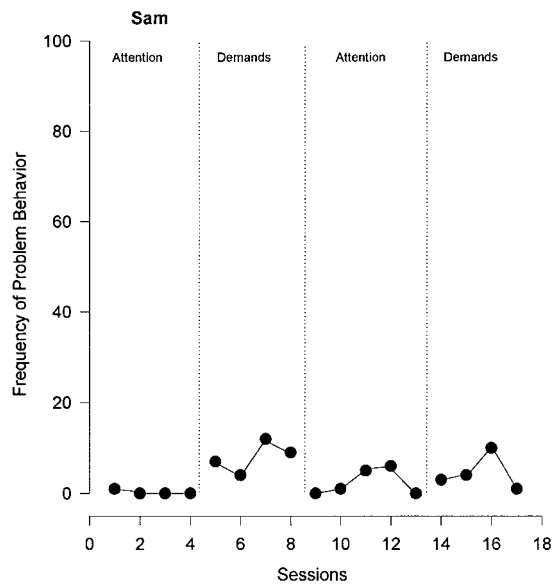


Figure 1. Comparison of the frequency of problem behavior in social attention and academic demand conditions for Sam when small objects (wristbands) were permitted in all the sessions. Sessions labeled "attention" are conditions in which the experimenter attended to Sam contingent on problem behavior. Sessions labeled "demands" involved presenting Sam with academic demands and providing him with a brief escape from demands following any display of problem behavior.

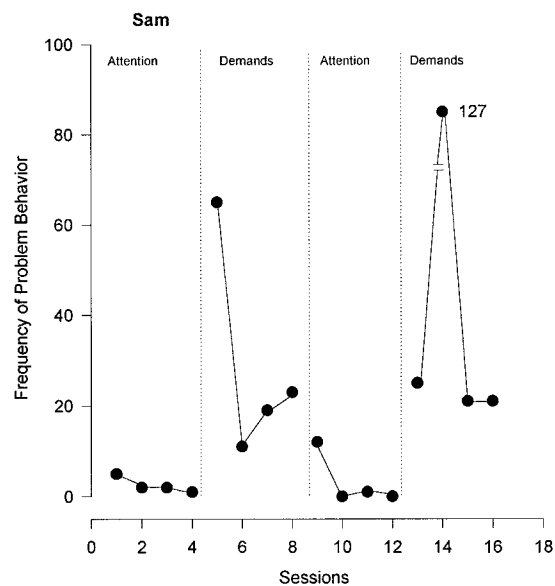


Figure 2. Comparison of the frequency of problem behavior in social attention and academic demand conditions for Sam when small objects (wristbands) were not permitted in the sessions. (Note that Sam nonetheless successfully obtained a different small object [balls] in the social attention condition.)

behavior did not correspond to the high rates reported by Sam's teacher.

Following the naturalistic observations, a second series of functional analyses was conducted, the results of which are shown in Figure 2. During these sessions, Sam was required to remove his wristbands (i.e., removal of idiosyncratic stimuli) prior to the functional analyses. In the social attention sessions, Sam displayed minimal problem behavior (mean frequency of 3.1 problem behaviors per session). However, in the academic demand sessions, Sam exhibited substantially higher frequencies of problem behavior (mean frequency of 48.5 problem behaviors per session). The data presented in Figure 2 reflected the reports by the classroom staff that Sam responded to many task demands with high rates of problem behavior. It still remained unclear whether de-

mands per se were the relevant motivating variable, because demands did not evoke problem behavior when wristbands were present (Figure 1), but evoked high rates of problem behavior when wristbands were absent (Figure 2). Specifically, in the second series of functional analyses, we observed that Sam grasped other small objects (e.g., balls) that were present in the social attention sessions, but was unable to do so during the academic demand sessions due to the prompting procedures used by the experimenter (i.e., during the demand condition, the experimenter did not permit Sam to wander over to the area where the balls were kept). To determine the potential influence of holding objects on Sam's problem behavior, a final series of manipulations was necessary in the social attention condition in which the demands were absent and the presence versus absence of small objects could be manipulated.

Figure 3 shows the results of the final se-

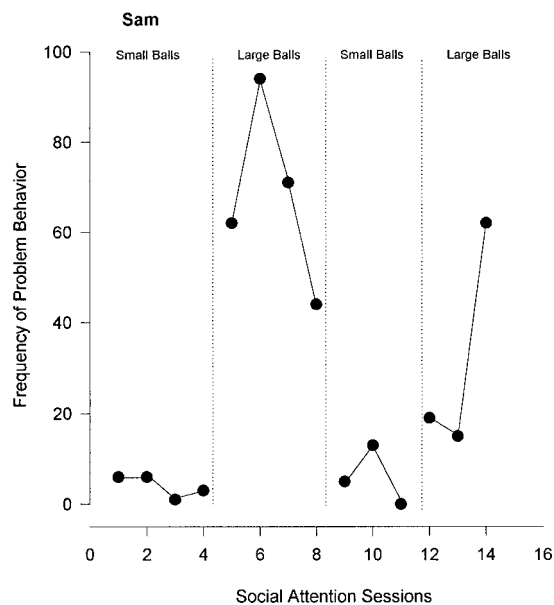


Figure 3. The frequency of problem behavior for Sam in social attention sessions when small balls were present compared to those sessions in which large balls were present.

ries of functional analyses. All sessions in the final phase were standard social attention sessions in which the experimenter attended to Sam whenever he displayed problem behavior. Sam displayed relatively low frequen-

cies of problem behavior in the small balls sessions (mean frequency of 4.9 problem behaviors per session). Substantially higher frequencies of problem behavior were evident in sessions with large balls (mean frequency of 52.4 problem behaviors per session).

#### Bart

Figure 4 shows the number of episodes of problem behavior in each session for the two conditions for Bart. All sessions involved demands. In the first condition, labeled "books," Bart was presented with a variety of table tasks that required responses such as pointing and counting. All of these sessions included books that were similar in shape and size to the puzzles used in subsequent puzzles sessions in order to control for the presence of puzzles in those sessions. The frequency of problem behavior in the books sessions was zero. The second condition, labeled "puzzles," involved both demands and the placement of several puzzles in the room in which the functional analysis was conducted (the puzzles and books were placed on a table located 1 m from the work area). When puzzles were present in the assessment

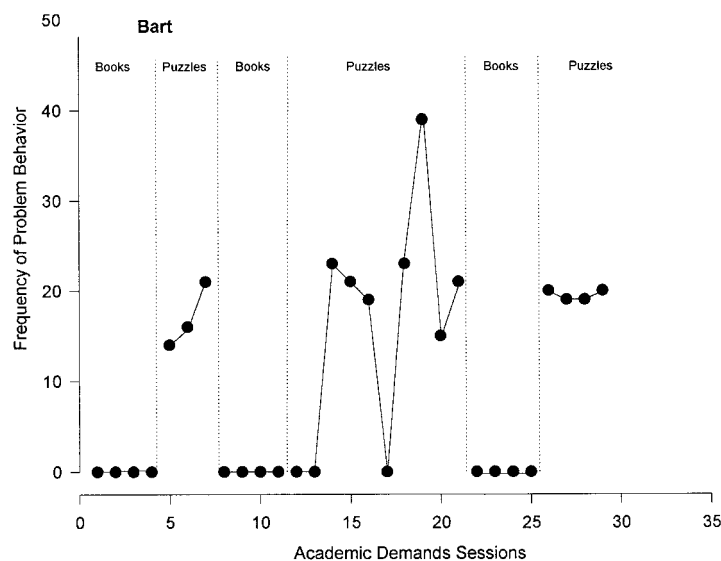


Figure 4. The frequency of problem behavior for Bart in academic demand sessions comparing sessions in which books were present to those in which puzzles were present.



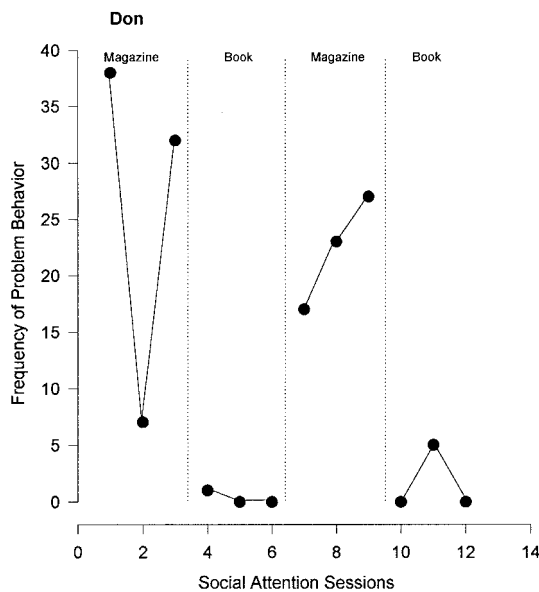


Figure 5. The frequency of problem behavior for Don in social attention sessions comparing sessions in which the experimenter read a magazine to those in which the experimenter read a plain-covered library book.

room, a sharp increase in the frequency of problem behavior occurred (mean frequency of 17.1 problem behaviors per session).

#### Don

The results for Don are shown in Figure 5. All sessions were conducted as social attention (i.e., social disapproval) sessions, in which Don was provided with a variety of recreational materials and was instructed to spend his time engaged with the materials while the experimenter "worked." Work, for the experimenter, consisted of one of two things. In the first condition, work involved reading a magazine filled with television advertisements and other media personalities (*People* and *TV Guide*). This condition is labeled "magazine" in Figure 5. In the second condition, labeled "book," work for the experimenter consisted of reading a book with a plain yellow cover (*The Grapes of Wrath*). Don displayed markedly higher frequencies of problem behavior in sessions in which the experimenter read a magazine (mean fre-

quency of 24.0 problem behaviors per session) than in those sessions in which the experimenter read a book (mean frequency of 1.0 problem behaviors per session).

#### DISCUSSION

The goal of the present study was to examine the impact that idiosyncratic stimulus variables can have on the frequency of problem behavior observed during a functional analysis. The data indicated that the presence or absence of these variables could dramatically alter the outcome of the analysis.

Both interview and naturalistic observation suggested plausible initial hypotheses concerning the variables thought to influence problem behavior for each individual, namely, social attention and escape for Sam, escape for Bart, and attention for Don. However, the role of negative reinforcement (i.e., escape from demands) and positive reinforcement (i.e., social attention) in maintaining the problem behavior was unclear until we analyzed the impact of idiosyncratic stimulus variables.

The presence or absence of idiosyncratic stimulus variables systematically altered the outcome of each analytic condition. For Sam, the absence of small objects (i.e., wristbands, small balls) was associated with high frequencies of problem behavior in the demand condition (Figure 2), an outcome that suggested maintenance via negative reinforcement, and high frequencies were seen during the attention condition (Figure 3), an outcome that suggested maintenance via positive social reinforcement. In contrast, the presence of small objects (Figures 1, 2, and 3) was associated with low frequencies of problem behavior irrespective of whether Sam was observed in a demand condition or an attention condition, suggesting that problem behavior was maintained by neither negative reinforcement nor positive social reinforcement. In sum, for a given condition

(i.e., attention or demand), one could draw opposite conclusions about the maintaining variables, depending on whether idiosyncratic stimuli (small objects) were present.

The results obtained for Bart and Don parallel those for Sam. Specifically, for Bart, when the idiosyncratic stimulus (i.e., puzzles) was present in the demand condition, problem behavior was high, suggesting the operation of negative reinforcement. However, in the same condition, when the stimulus was absent (i.e., puzzles were replaced by books), there was no problem behavior, suggesting that negative reinforcement was not a maintaining variable. Likewise, for Don, when the idiosyncratic stimulus (i.e., magazines) was present in the attention condition, problem behavior was high, suggesting the operation of positive social reinforcement. However, in the same condition, when the stimulus was absent (i.e., the magazine was replaced by a book), problem behavior was low, suggesting that positive social reinforcement was not a maintaining variable.

Variable patterns of responding in the presence of a fixed analytic condition have been interpreted as showing the influence of factors that had not been identified prior to the analysis, and had therefore not been incorporated into the analysis (Bodfish, 1990; Iwata *et al.*, 1982/1994; Mace & Roberts, 1993). Current assessment methodology could accommodate the analysis of these variables if they were identified ahead of time so that they could be incorporated directly into the functional analysis for systematic study. Thus, in principle, we might have constructed, at the outset, a separate tangible condition in which the presence or absence of small objects, puzzles, and magazines was manipulated to study their effect on rates of problem behavior. However, this strategy begs the question because, in order to construct a relevant tangible condition, we would have to have known ahead of time

what specific (idiosyncratic) stimuli were worth manipulating in a functional analysis. Our initial interviews suggested, however, the primacy of escape and attention variables but not tangible items, least of all the idiosyncratic ones that were eventually identified through naturalistic observation. Our data thus raise the question of whether it might be possible to formulate heuristic guidelines concerning when to suspect the influence of idiosyncratic stimulus variables whose presence could alter the results of a functional analysis and, therefore, its subsequent interpretation. When the presence of idiosyncratic stimuli is suspected, one can carry out relevant descriptive analyses. Earlier in this paper, we described one method for carrying out this type of analysis, and others exist in the literature as well (e.g., Lerman & Iwata, 1993; Mace & Lalli, 1991; Sasso *et al.*, 1992). Because descriptive analysis can be time consuming, there is a pressing need for developing guidelines as to when to suspect the influence of idiosyncratic stimuli and, therefore, when systematic descriptive analysis might be necessary.

The first and perhaps most critical guideline is that the influence of idiosyncratic stimuli should be suspected whenever there is a discrepancy between interview information and functional analysis results. Discrepancies are particularly likely to arise because the idiosyncratic nature of the controlling stimuli means that they are easily overlooked by informants and, therefore, are not reported during an interview. Thus, at no point in the interview did Sam's teacher, for example, mention that a lack of opportunity to hold small objects was an important determinant of Sam's problem behavior.

A second plausible guideline is that the influence of idiosyncratic stimuli should be suspected when different results are obtained for identical analytic conditions conducted across different settings. Consider Bart, for example. If he were presented with demands

in a speech therapy room where no puzzles were present, problem behavior would likely not have been evident. In contrast, if he were presented with the same demands in his classroom, where other children were playing nearby with puzzles, he would likely have displayed problem behavior. Given that demands were held constant and yet problem behavior varied, it became imperative to explore how the two settings differed with respect to factors that were extraneous to the demands, namely, idiosyncratic stimuli. A clinical implication of this guideline might entail conducting functional analyses across settings to permit the identification of idiosyncratic stimuli.

Third, the influence of idiosyncratic stimuli should be suspected when results vary across days in the same analytic condition conducted in the same setting. Consider Don, for example. It is entirely conceivable that in a fixed analytic condition (i.e., teacher busy working with another student), he would nonetheless show high rates of problem behavior on some days and low rates on other days, in spite of the fact that the classroom setting per se remained the same across days. Specifically, the random and inadvertent introduction of magazines across days would likely have produced a similarly random pattern of problem behavior that is sometimes referred to in the literature as undifferentiated responding (Iwata et al. 1982/1994; Mace & Roberts, 1993). This circumstance, too, should prompt the assessor to undertake a descriptive analysis as a method of searching for and identifying the likely presence of idiosyncratic stimuli. Indeed, we made use of this third guideline to identify the idiosyncratic stimuli for Sam. Specifically, in the classroom, we noted that the frequency of Sam's problem behavior varied widely across days during a fixed demand condition (e.g., language training). This variability caused us to look more closely at the stimulus configuration that was present

during demands to see whether there were differences across days. Close scrutiny yielded the observation that wristbands were generally present on good behavior days and were generally absent on bad behavior days.

Finally, examination of within-session patterns of responding (Vollmer, Iwata, Zarcone, Smith, & Mazaleski, 1993) might provide additional information suggesting the operation of idiosyncratic stimuli. Consider Bart, for example. One could examine his problem behavior in the puzzles condition. If his problem behavior were escape motivated, one would expect to see little of it during the time-out from tasks and more during the task presentation periods. In contrast, to the extent that his problem behavior occurred more randomly throughout the session, one would expect the operation of a variable other than escape motivation, plausibly the influence of idiosyncratic stimuli. Pattern analysis would thus be helpful in eliminating escape motivation per se as a hypothesis concerning the motivation of problem behavior.

These four suggested guidelines, although not exhaustive, could provide a useful heuristic regarding when to suspect the influence of idiosyncratic stimuli, and, therefore, when it might be prudent to undertake a descriptive analysis to identify such stimuli for later inclusion in systematic functional analyses.

Because the focus of our study was on documenting the impact of idiosyncratic stimuli on problem behavior rather than on identifying the function of problem behavior per se, no definitive statement can be made regarding how to categorize the idiosyncratic stimuli with respect to traditional functional categories. However, at a speculative level, one possibility is that these stimuli may relate to seeking tangible items. Thus, Sam was frequently observed holding a variety of small objects (e.g., wristbands, small balls, eating utensils, keys, etc.) throughout the

school day, and each of these was associated with low rates of problem behavior. One could test the tangible hypothesis by presenting selected idiosyncratic stimuli contingently on problem behavior to see whether the rate of such behavior subsequently increased. The addition of a tangible condition to the functional analysis could therefore identify behavioral function (e.g., Bowman, Fisher, Thompson, & Piazza, 1997). At that point, interventions could be designed to teach the individual to request the idiosyncratic stimulus when appropriate or, alternatively, to provide a functionally equivalent and socially acceptable substitute if the idiosyncratic stimuli were deemed socially inappropriate (Carr *et al.*, 1994). The key message, however, is that both the enhanced functional analysis and the interventions that logically follow from it are made possible through prior identification of idiosyncratic stimuli.

As we continue to move our applied research efforts into complex community settings, we can expect to encounter a wide array of idiosyncratic stimuli whose influence must be identified so that the results of functional analyses remain accurate and interpretable.

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## STUDY QUESTIONS

1. The authors describe a hypothetical situation in which idiosyncratic variables might affect the outcome of a functional analysis for aggressive behavior that is maintained by escape. Provide an example of how idiosyncratic variables could affect a functional analysis outcome for behavior that is maintained by attention.
2. The authors suggest that “when termination of a prompt constitutes a negative reinforcer for aggression, the prompt itself may become a discriminative stimulus (antecedent) for the aggressive behavior. This is so because behavior (aggression) emitted in the presence of the prompt reliably produces termination of the aversive stimulus (i.e., the prompt)” (p. 674). The important point of this statement is to call attention to the fact that the therapist’s responses may exert antecedent influence on behavior. In the particular example provided, however, describe how the prompt functions as an establishing operation, rather than as a discriminative stimulus, for aggression.



3. Briefly describe the three types of assessment procedures used in the study.
4. Summarize the individualized components of each participant's functional analysis and the results that were obtained.
5. The authors stated that Sam's high rate of problem behavior in the demand condition (Figure 2) suggested that his behavior was maintained by escape, whereas his high rate of problem behavior in the attention condition (Figure 3) suggested that the behavior was maintained by attention. Given the conditions to which Sam was exposed during these two functional analyses, why are both of these conclusions premature? In other words, what additional conditions might have been included in Sam's initial functional analysis that would not have implicated social reinforcement as a source of behavioral maintenance and perhaps would not have required a third functional analysis?
6. Why were tangible sessions not conducted, and what data would have been useful in identifying potential items for use in such sessions?
7. What guidelines did the authors provide for identifying situations in which behavior might be influenced by idiosyncratic stimuli?
8. In the absence of additional clarifying data, the authors speculated that participants' problem behaviors were maintained by access to tangible reinforcers (objects). Based on data presented in the study, suggest an alternative source of behavioral maintenance for each participant.

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